SBIR/STTR PROGRAM

Electrostatic Detection System, The Remote Voltage Sensor (RVS)

NASA success story

Objective

San Diego based QUASAR Federal Systems (QFS) has developed an enhanced electric potential sensor that is capable of remote, real-time monitoring of electrostatic charges in semiconductor manufacturing facilities. The sensor is a miniature (dime-size) device incorporating proprietary circuitry that provides the capability to observe a potential change of one hundred volts at one meter away.

RVS sensor with control module

The sensor is incorporated in a product called the Remote Voltage Sensor (RVS). Current and potential market applications include its use in manufacturing facilities for charge-sensitive products such as spacecraft electronics, semiconductor and flat panel display manufacturing. The RVS is the first device that allows practical, real-time monitoring and detection of electrostatic hazards at a distance.

Technology Advantages

QFS has been successful in the development of exceptionally sensitive, state-of-the art electromagnetic sensing devices tailored to specific government project specifications. These sensors are designed to be portable, rugged, low powered and low cost. They include high sensitivity electric-field sensors, the first commercially available 3-axis electric-field sensors, high sensitivity, compact magnetic B-field sensor, and the only integrated electric plus magnetic (E+B) sensing system.

Commercial Partner

QFS has a patent pending on the Remote Voltage Sensor (RVS). Additionally, QFS has a strategic alliance with MKS Instruments who is a global provider of instruments, subsystem and process control solutions that measure control, power, monitor and analyze critical parameters of advanced manufacturing processes to improve process performance and productivity. MKS launched the RSV at the Semicon West show in 2006 as part of the company's product line. RVSs are now in use and being evaluated for use by many of the major manufacturers of electronics and electronic fabrication equipment.

Although initially developed for NASA's spacecraft manufacturing facilities, the RVS system is now used in other sensitive manufacturing facilities such as those for producing semiconductor wafers and flat-panel displays. Current and potential markets for RVS monitoring system include Front-end Semiconductor Wafer Handling, Flat-panel Processing, Wafer Charge Monitoring in Process Tools, Semiconductor Device Charge Measurement and Disk Drive Voltage Detection.

NASA Benefits

QFS' technology provides benefits for personnel safety and device protection during manufacturing and spacecraft assembly. The RVSs are very small, and the monitoring system is easy to use and very inexpensive.

Static charge buildup is a problem for NASA, both because of the flammability of fuels and the delicacy of spacecraft electronics. The RVS monitoring system replaces the current time-consuming, prior state-of-the-art systems. Such systems were not able to detect static charges generated after assembly workers entered a facility, an important consideration as static can build during the manufacturing process. QFS' RVSs are 100X more sensitive than others sensors, and are small enough for workers to wear. Additionally, QFS RVSs do not have moving parts, thus eliminating them as a charge source, which is a major problem with prior devices.

By avoiding static-related defects, RVS contributes to the overall productivity of the electronics industry. The ability to alert workers to potentially explosive conditions may save lives as well.

SBIR Role

QFS scientist Dr. Yongming Zhang worked with NASA COTR Dr. Carlos Calle, Lead Scientist, Electromagnetic Physics Laboratory, Kennedy Space Center, on the two Small Business Innovation Research (SBIR) contracts for this project. Phase I was completed in 2004 and phase II was completed in 2005-2006.

In 2007, the Department of Defense's Defense Advanced Research Projects Agency (DARPA) selected QFS as one of the agency's company "success stories" under its SBIR program, stating the company "advances state-of-the-art defense technology."

Point of Contact

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